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An update on *Acalypha inselbergensis* Cardiel & I. Montero (Euphorbiaceae): a recently described species from Brazil

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Abstract

Acalypha inselbergensis Cardiel & I. Montero is newly recorded in 38 localities from the Brazilian states of Alagoas, Bahia, Pernambuco, and Sergipe. In addition, first photographs *in situ*, a distribution map, phenology data, conservation status, and a key to *A. inselbergensis* and related species from Northeastern Brazil are provided.

Keywords

Acalyphoideae, glandular trichomes, new records, taxonomy.

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Introduction

Acalypha L. (Euphorbiaceae, Acalyphoideae) appears among the most numerous genera in Euphorbiaceae, with approximately 500 species (Cardiel and Muñoz-Rodríguez 2012). The genus is distributed mainly in the Pantropical region, with only a few species inhabiting in temperate zones, and the Neotropical region holding about 60% of the representatives (Martínez-Gordillo et al. 2002; Steinmann 2002; Cardiel et al. 2013). In Brazil, 53 species are known, 31 of them endemic (BFG 2015).

Despite being considered a natural and well-defined genus, it is still poorly known taxonomically (Cardiel and Muñoz-Rodríguez 2012). This lack of detailed information concerning *Acalypha* L. is longstanding, and largely linked to the absence of recent revisions of that group—resulting in difficulties on recognizing the species, diversity, and geographic distribution data. The most comprehensive study of *Acalypha* in Brazil is the Flora Brasiliensis (Müller 1874), which recorded 36 species for this genus. Since then, new taxa have been added in isolated studies (e.g. Ridley 1890; Ule 1908; Pax and Hoffmann 1924; Allem and Irgang 1976; Allem and Waechter 1977; Cardiel et al. 2018; Sousa et al. 2019).

Acalypha inselbergensis Cardiel & I. Montero, a recently described species (Cardiel et al. 2018), can exemplify the consequences of the scarcity of taxonomic information, and the lack of experts working with the genus in Brazil. The species was described based only on the type collection from Pernambuco, in the Northeastern region of Brazil. However, during the taxonomic revision of the *Acalypha* species occurring in Northeastern

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Brazil (Barros-Júnior 2018), a significant number of exsiccates have shown to have a set of compatible morphological characteristics with *A. inselbergensis*.

The present study brings numerous new records for *A. inselbergensis*, information on the habitat and conservation status, first photographs *in situ*, a distribution map, and phenology data. We also provide a key to identify *A. inselbergensis* and related species occurring in Northeastern Brazil.

Methods

The study was based on the analysis of field populations, and specimens from ALCB, HESBRA (not indexed), HRB, HST, HUEFS, HVASF, LZ, MAC, MOSS, PEUFR, RB, ROST, UB, and UFP herbaria [acronyms follow Thiers (2019)]. Vouchers were deposited in HESBRA (Unidade Acadêmica de Serra Talhada, Universidade Federal Rural de Pernambuco, Brazil). Relevant bibliography (e.g. Müller 1874; Cardiel et al. 2018) and images of types collections available on the JSTOR Global Plants (https://plants.jstor.org/) were used for identification, comparison, and confirmation of the taxa. The terminologies of Lawrence (1973), Radford et al. (1974), and Simpson (2006) were used for standardization of the morphological terms in the description. Information of geographic distribution, habitat, and phenology is based in the fieldwork and data from exsiccate labels.

The conservation status is following the criteria proposed by the IUCN Red List, Version 3.1 (IUCN 2012) and implemented in the tool Geocat (http://geocat.kew.org/) according to Bachman et al. (2011). The distribution map was produced using the Quantum Geographic Information System (QGIS) version 2.18 (QGIS Development Team 2016).

Results

Acalypha inselbergensis **Cardiel & I. Montero,**
Phytotaxa 356 (2): 158–166. 2018.

Figures 1, 2

Type. Brazil. Pernambuco, Brejo da Madre de Deus municipality, rock outcrop at the north shore of the Sitio Oítis dam, 560 m; 08°05.306′S, 036°22.909′W; 16 Dec. 1999;

Figure 1. *Acalypha inselbergensis*. **A.** Habit. **B.** Detail of the leaf. **C.** Branch with solitary pistillate bract. **D.** Branch with bisexual inflorescence.

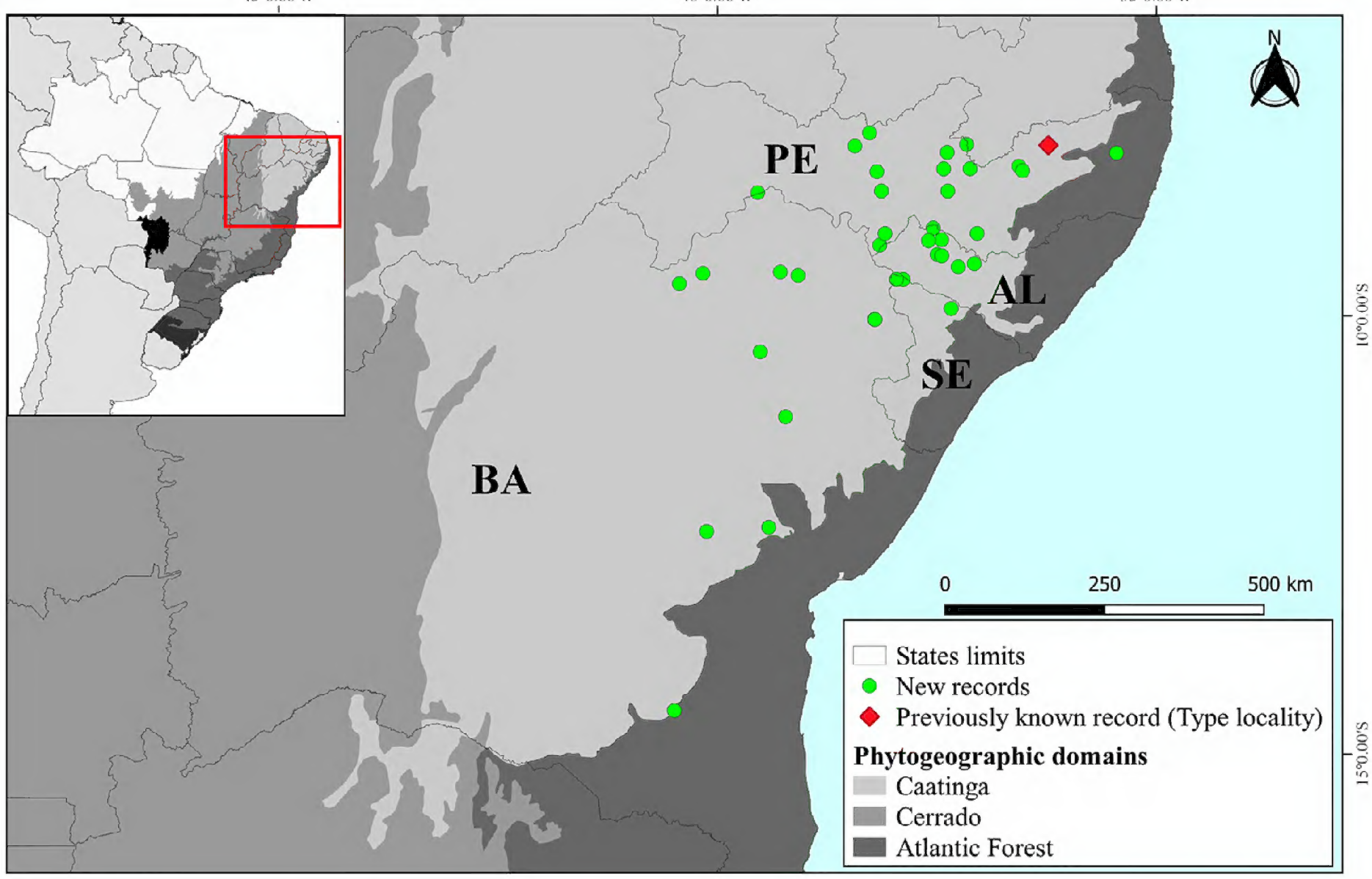

Figure 2. Distribution map of *Acalypha inselbergensis*. The green circles represent the new records, and the red rhombus represent the previously known record. State abbreviatons: AL = Alagoas, BA = Bahia, PE = Pernambuco, and SE = Sergipe.

L. Krause & A. Liebig 276 (holotype, RB 00752960S!; isotypes LZ; PEUFR 30024!; ROST; S 11-29219!).

New records/material examined. BRAZIL • state of Alagoas, Água Branca, Fazenda Cobras; 09°16′13″S, 037°54′13″W; 24 Mar. 2006; fl.; *R. P. Lyra-Lemos et al.* 9316 (MAC 24275). • Batalha, margens do Rio Traipu; 09°40′40″S, 037°07′29″W; 21 Feb. 2009; fl., fr.; *Chagas-Mota 2091* (MAC 36721). • Inhapi, Serra do Grude; 09°13′25″S, 037°44′55″W; 23 Apr. 2009; fl., fr.; *Chagas-Mota & L. M. Leão 3045* (MAC 38333). • Olho d'Água do Casado, Fazenda Capelinha; 09°30′08″S, 037°49′46″W; 27 Sep. 1999; fl.; *R. A. Silva & D. Moura 1110* (PEUFR 38220). • Pão de Açúcar, Mata da Onça; 09°44′11″S, 37°25′58″W; 04 May 2002; fl.; *R. P. Lyra-Lemos 6665* (MAC 16080). • Pariconha, Serra do Engenho, 09°14′17″S, 037°59′48″W; 27 May. 2007; fl., fr.; *R. P. Lyra-Lemos et al. 10403* (MAC 30255). • Piranhas, Área de Canyon; 09°31′39″S, 037°44′36″W; 29 Jul. 1999; fl.; *R. A. Silva & D. Moura 725* (PEUFR 38670). • state of Bahia, Canudos; 09°54′00″S, 39°08′00″W; 10 May 2003; fl.; *A. Rodarte 129* (ALCB 66789). • Curaçá, Fazenda Tanquinho; 08°59′31″S, 039°54′15″W, 11 Aug. 1983; fl.; *S. B. da Silva & G. C. P. Pinto 315* (HRB 13475). • Glória; 09°19′38″S, 038°15′05″W; 26 Apr. 2001; fl.; *L. P. Queiroz et al. 6557* (HST 19682). • Iaçú, Fazenda Lapa; 12°46′04″S, 040°12′27″W; 26 Feb. 1983; fl., fr.; *G. C. P. Pinto 150* (HRB 11664). • Itatim, Morro do Agenor; 12°41′28″S, 039°41′49″W; 26 Nov. 1995; fl., fr.; *F. França et al. 1457* (UB 150376). • Itiúba, Fazenda Experimental da EPABA; 10°4119″S, 039°51′24″W; 26 May 1983; fl.; *H. P. Bautista & G. C. P. Pinto 748* (HRB 11104). • Jeremoabo; 10°04′14″S, 038°20′41″W; 13 May 1981; fl.; *L. M. C. Gonçalves 43* (HRB 2939). • Jeremoabo; 10°04′00″S, 038°21′00″W; 20 Jan. 2006; fl.; *G. C. Sessegolo et al. 225* (ALCB 75227). • Juazeiro, entroncamento de Juazeiro-Caraiba; 09°63′33″S, 040°43′33″W; 08 Aug. 1985; fl., fr.; *G. Fotius 4103* (HUEFS 168000). • Massaroca, próximo a localidade Flamengo; 09°51′51″S, 040°16′55″W; 18 Jan. 1980; fl.; *O. F. de Oliveira 788* (MOSS 1328). • Santaluz; 11°15′06″S, 039°22′40″W; 27 Mar. 2010; fl.; *E. P. Queiroz 4398* (HRB 58990). • Santa Brígida; 09°44′34″S, 038°04′58″W; 27 Nov. 2009; fl.; *E. Melo et al. 7250* (HUEFS 157602). • Uauá, Serra do Jerônimo; 09°50′00″S, 039°28′42″W; 30 Mar. 2000; fl.; *M. R. Fonseca et al. 1355* (HRB 42998). • Vitória da Conquista, Flamengo, Fazenda Flamengo; 14°50′33″S, 040°49′10″W, 27 Feb. 1968; fl., fr.; *I. Pontual 775* (PEUFR 2297). • state of Pernambuco, Águas Belas, Mata da Serra do Comunaty; 09°06′05″S, 037°04′06″W; 20 Jul. 2007; fl., fr.; *G. T. Soldadi et al. 113* (PEUFR 49496). • Bezerros, Parque Municipal de Serra Negra; 08°14′17″S, 035°45′25″W; 12 Apr. 1995; fl.; *M. Oliveira et al. 28* (PEUFR 20043). • Buíque, Parque Nacional do Catimbau, 08°32′03″S, 037°12′05″W; 26 Jan 2011, fl.; *M. Oliveira & C. F. Fonseca 5454* (HESBRA 177). • Custódia, área do PISF, próximo ao Reservatório Copoti; 08°13′54″S, 037°38′16″W; 15 Apr. 2009, fl., fr.; *M. Oliveira & J. G. Carvalho-Sobrinho 2124* (HESBRA 337). • Floresta, Fazenda Jatobá; 08°35′39″S, 038°18′32″W; 16 Nov. 2011, fl.; *F. F. S. Silva et al. 523* (HESBRA). • Ibimirim, Fazenda Mandacarú;

08°32′22″S, 037°42′18″W; 16 Feb. 1996; fl., fr.; *M. Oliveira et al. 184* (PEUFR 22162). • Manari, Povoado Aguadinho; 08°57′51″S, 037°37,48″W; 22 Aug. 2012; fl., fr.; *A. C. P. Oliveira et al. 1497* (HVASF 16932). • Mirandiba, Serra das Amburanas; 08°06′17″S, 038°43′47″W; 10 Feb. 2007; fl., fr.; *M. F. A. Lucena et al. 1685* (UFP 46967). • Pedra; 08°29′25″S, 036°56′49″W; 09 Mar. 2007; fl.; *L. Lima & J. S. Silva 9* (PEUFR 49896). • Petrolândia, Tacaicó, 08°57′51″S, 038°13′11″W; 29 Jan 2009, fl.; *V. D. Silva et al. 95* (HESBRA 336). • Serra Talhada, povoado de serrinha; 07°91′15″S, 038°26′60″W; 17 Aug. 2012; fl.; *N. M. Almeida & R. A. Cavalcante 85* (HVASF 16531). • Sertânia, Ramal Agreste; 008°04′28″S, 37°16′04″W; 31 Jan. 2014; fl.; *A. C. P. Oliveira et al. 3115* (HVASF 22034). • Tacaratu, estrada para Tacaicó; 09°06′20″S, 038°09′00″W; 15 Jan. 2009; fl., fr.; *J. G. Carvalho-Sobrinho et al. 1823* (HVASF 2937). • Venturosa, Parque Municipal Pedra Furada; 08°34′29″S, 036°52′26″W; 16 Apr. 2010; fl.; *P. Gomes et al. 402* (UFP 55235). • state of Sergipe, Canindé do São Francisco, Fazenda Brejo; 09°58′52″S, 037°88′26″W; 2 Jun. 1999; fl., fr.; *D. Moura 312* (PEUFR 38674). • Curituba, Fazenda Cana Brava; 09°58′37″S, 037°96′04″W; 3 Dec. 1999; fl., fr.; *R. A. Silva & D. C. Moura 1008* (UFP 28447). • Porto da Folha, Fazenda São Pedro; 09°91′59″S, 037°33′70″W; 20 Jul. 2006; fl.; *M. F. A. Lucena et al. 1523* (UFP 46971).

The present study shows new records of this species for 38 localities in the states of Alagoas, Bahia, Pernambuco, and Sergipe, restricted to the Seasonally Dry Tropical Forests and Woodlands (SDTFW; Caatinga domain) of these four states (Fig. 2). Especially in Pernambuco state, this species occurs in conservation areas namely, Serra Negra Municipal Park, Catimbau National Park, and Pedra do Cachorro Private Reserve of National Heritage. The taxon was recorded from sandy or clayey soils, of shrub-tree vegetation, on rocky outcrops, and in disturbed areas. The significant number of specimens of *Acalypha inselbergensis* found during our study allowed us to evaluate for the first time its conservation status and provide information about their flowering and fruiting (Cardiel et al. 2018). According to the criteria established by the IUCN (2012), *A. inselbergensis* is in the low risk category, Least Concern, because the species has an extent of occurrence of 157,850,931 km^2 and occurs in 39 localities belonging to four states of Brazil, including the protected areas mentioned above. The species was recorded with flowers and fruits throughout of the year.

Identification. Shrubs 0.5–4 m high; monoecious. Branches green or dark brown; young branches with glandular sessile trichomes, rarely interspersed with simple trichomes, puberulent; mature branches glabrous, lenticelate. Stipules 2–3 mm long, triangular, with glandular sessile trichomes. Petioles 6–26 (–45) mm long, angular, with sessile glandular trichomes, rarely interspersed with simple trichomes, puberulent. Leaf blades 20–65 × 10–35 mm, ovate-lanceolate to triangular-lanceolate, thin-membranaceous; base obtuse to subcordate; apex acuminate; margin crenate; both surfaces with sessile glandular trichomes, rarely simple, puberulent on veins; palmately veined, primary veins 5. Inflorescences axillary, bisexual, 1–3 pistillate bracts, and solitary staminate bracts. Bisexual inflorescences 20–55 mm long, with staminate flowers in upper position; peduncle 0.5–1 mm long; staminate portion 16–50 mm long, bracts 1 mm long, elliptical, base and apex obtuse, with glandular sessile trichomes; pistillate portion 5–8 mm long, bracts 1–3, reniform, 4–5 mm long, margin entire, base cordate, with sessile glandular trichomes, 1–3 flowered. Solitary pistillate bract with peduncle c. 0.5 mm long. Staminate flowers pedicellate, sepals 4, ovate, puberulent, with simple trichomes. Pistillate flowers sessile; sepals 3, ovate, ciliated, with sessile glandular trichomes; ovary 1–1.5 × 1–2 mm, muricate, puberulent, with glandular stipitate trichomes, and rarely simple trichomes; styles 5 mm long, laciniated into 27–30 segments. Fruit capsular, trilobate, 1–2 × 2–2.5 mm, muricated, with stipitate glandular trichomes, rarely simple trichomes, and puberulent. Seeds ovoid, ca 1 × 1 mm, carunculate, foveolate, dark brown.

Discussion

Acalypha inselbergensis was described only from the type location in the northeast of Pernambuco, on a granitic rock outcrops (inselbergs) at 560 m (Cardiel et al. 2018). The present study shows that this species has a much wider distribution in the Caatinga Domain (SDTFW) and that it is recorded in different substrates, such as in sandy or clayey soils, and also in disturbed areas.

Acalypha inselbergensis can be confused with *A. amblyodonta* (Müll. Arg.) Müll. Arg., although this species differs by the lack of exudate, leaves and branches with simple trichomes, opaque, and dentate pistillate bract (*vs.* with exudate, leaves and branches with glandular trichomes, shiny and entire pistillate bract in *A. inselbergensis*) (Cardiel et al. 2018). *Acalypha inselbergensis* is also morphologically close to *A. brasiliensis* Müll. Arg., since both have oval-lanceolate leaf blades, palmately veined, bisexual inflorescence, and pistillate flowers 1–3 per bract. However, they are mainly differentiated by the simple and/or stellate trichomes in the branches and leaves, and trichomes with stipitate glands in the bracts, in *A. brasiliensis*, while *A. inselbergensis* has sessile glandular trichomes, which expel secrets a large amount of viscous substance on the surface of almost all structures vegetative and floral.

Although glandular trichomes are relatively common in *Acalypha*, the morphological type found in *A. inselbergensis* seems outstanding, because it is sessile, generally globose, and viscous. The presence of a viscous substance covering the entire plant also occurs in *Acalypha gummifera* Lundell, which is a Central American species with lanceolate leaf blades, and pistillate flowers pedicellate, with 5 sepals. Although not yet recorded in

the literature for *Acalypha* (Baillon 1858; Müller 1874; Pax and Hoffmann 1924), sessile glandular trichomes are found in Malvaceae (e.g. *Herissantia crispa* (L.) Brizicky and *Hibiscus tiliaceus* L.), being also considered as a taxonomic characteristic (Fahn 1979). Usually glandular trichomes have the function of protecting against herbivory, reflecting light, protecting structures or organs in development, reducing transpiration and water retention (Fahn 1979). It is possible that in *A. inselbergensis* this type of trichome has also some of the functions aforementioned, since it occurs in Caatinga domain.

Identification key for *Acalypha inselbergensis* and similar Northeast Brazil species

1. Leaves glabrous or subglabrous; staminate bract triangular; some staminate inflorescences terminal . . . . . ***A. multicaulis* Müll. Arg.**

1′. Leaves with simple, stellate or glandular sessile trichomes; staminate bracts elliptical or lanceolate; all staminate inflorescences axillary 2

2. Leaves and fruits with stellate trichomes . . . . . ***A. brasiliensis* Müll. Arg.**

2′. Leaves and fruits with simple or glandular trichomes 3

3. Leaves and branches with simple trichomes, opaque; pistillate bracts with dentate margin . . . . . ***A. amblyodonta* (Müll. Arg.) Müll. Arg.**

3′. Leaves and branches with glandular trichomes, shiny; pistillate bracts with entire margins . . . . . ***A. inselbergensis* Cardiel & I. Montero**

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Authors' Contributions

LMJ and ALM designed the study and collected data. All authors examined the data and discussed the results. YR, JMC, and SMAS wrote the manuscript. All authors reviewed the manuscript.

References

Allem AC, Irgang BE (1976) Nuevas especies de Euphorbiaceae de América del Sur. 1. Boletín de la Sociedad Argentina de Botánica 17 (3–4): 301–306.

Allem AC, Waechter JL (1977) Notas sistemáticas y nuevos sinónimos en Euphorbiaceae de América del Sur. II. Revista Brasileira de Biologia 37 (1): 91–101.

Bachman S, Moat J, Hill AW, Torre J, Scott B (2011) Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. ZooKeys 150: 117–126. https://doi.org/10.3897/zookeys.150.2109

Baillon HE (1858) *Acalypha*. In: Baillon HE (Ed) Étude générale du groupe des Euphorbiacées. Librairie de Victor Masson, Paris, 440–445. https://doi.org/10.5962/bhl.title.50439

Barros-Júnior LMMR (2018) Taxonomia do gênero *Acalypha* L. (Euphorbiaceae) no Nordeste do Brasil. Master Thesis, Universidade Federal Rural de Pernambuco, Recife, 110 pp.

BFG. The Brazil Flora Group (2015) Growing knowledge: an overview of seed plant diversity in Brazil. Rodriguésia 66 (4): 1085–1113. https://doi.org/10.1590/2175-7860201566411

Cardiel JM, Muñoz-Rodríguez P (2012) Synopsis of *Acalypha* (Euphorbiaceae) of continental Ecuador. PhytoKeys 17: 1–17. https://doi.org/10.3897/phytokeys.17.3190

Cardiel JM, Montero-Muñoz I, Sancho-García I (2018) Three new species of *Acalypha* (Euphorbiaceae, Acalyphoideae) from Argentina, Bolivia, Brazil and Paraguay. Phytotaxa 356 (2): 158–166. https://doi.org/10.11646/phytotaxa.356.2.5

Cardiel JM, Nee M, Muñoz-Rodríguez P (2013) Synopsis of *Acalypha* L. (Euphorbiaceae) of Peru and Bolivia, with description of a new species. Anales del Jardín Botánico de Madrid 70 (2): 152–177. https://doi.org/10.3989/ajbm.2366

Fahn A (1979) Secretory tissues in plants. Academic Press, London, 302 pp.

IUCN (2012) IUCN Red List categories and criteria. Version 3.1. Second edition. IUCN, Gland, Switzerland and Cambridge, 32 pp. https://portals.iucn.org/library/sites/library/files/documents/RL-2001-001-2nd.pdf. Accessed on: 2019-12-14.

Lawrence GHM (1973) Taxonomia das Plantas Vasculares. Fundação Calouste Gulbenkian, Lisboa, 296 pp.

Martínez-Gordillo M, Jiménez J, Cruz R, Juárez E, García R, Cervantes A, Mejía R (2002) Los géneros de la familia Euphorbiaceae en México. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Botánica 73 (2): 155–281.

Müller J (1874) *Acalypha*. In: von Martius, CFP (Ed) Flora Brasiliensis, , enumeratio plantarum in Brasilia hactenus detectarum :quas suis aliorumque botanicorum studiis descriptas et methodo naturali digestas partim icone illustrates. Volumen XI, pars II. R. Oldenbour, Munchen/Leipzig, 338–370. https://doi.org/10.5962/bhl.title.454

Pax FA, Hoffmann K (1924) *Acalypha*. In: Engler A (Ed) Das Pflanzenreich: Regni vegetabilis conspectus. Heft 86, IV. 147. XVI. Wilhelm Engelmann, Leipzig, 1–231.

QGIS Development Team (2016) Quantum Geographic Information System. Open Source Geospatial Foundation Project, v. 2.18 Pisa. https://qgis.org/en/site/about/index.html. Accessed on: 2019-10-22.

Radford AE, Dickison WC, Massey JR, Bell CR (1974) Vascular Plant Systematics. Harper & Row Publishers, New York, 871 pp.

Ridley HN (1890) Notes on the botany of Fernando Noronha. Botanical Journal of the Linnean Society 27 (181): 1–95. https://doi.org/10.1111/j.1095-8339.1890.tb00800.x

Simpson MG (2006) Plant systematics. Elsevier-Academic Press, Amsterdam, 608 pp.

Sousa AAC, Cordeiro I, Caruzo MBR (2019). A new species of *Acalypha* L. (Euphorbiaceae) from the Brazilian Atlantic Rain Forest. Systematic Botany 44 (2): 346–348. https://doi.org/10.1600/036364419X15562052252171

Steinmann VW (2002) Diversidad y endemismo de la familia Euphorbiaceae en México. Acta Botánica Mexicana 61: 61–93. https://doi.org/10.21829/abm61.2002.909

Thiers B (2019) Index herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available at: http://sweetgum.nybg.org/science/ih/. Accessed on: 2019-11-27.

Ule EHG (1908) *Acalypha juruana*. In: Ascherson PFA (Ed.) Verhandlungen des Botanischen Vereins der Provinz Brandenburg 50, 78.